

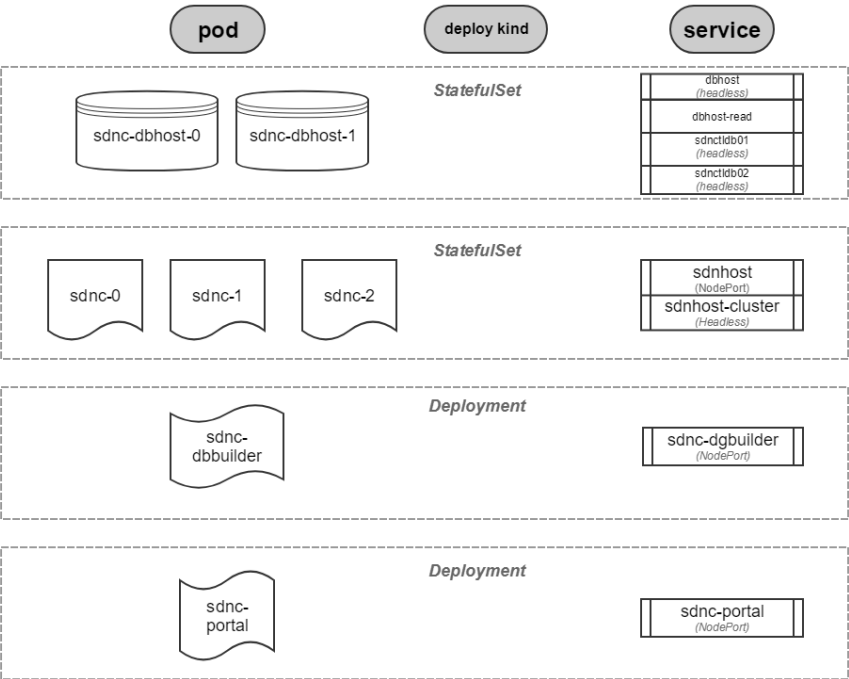
SDN-C Clustering on Kubernetes

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About the SDN-C Clustering

The following diagram illustrates the desired SDN-C cluster deployment (as described in [SDNC-163 - Getting issue details...](#) STATUS) from POD and SERVICE view, which will have:

- 2 DB pods
- 3 sdnc (ODL) pods
- 1 admin (portal) pod
- 1 dgbuilder pod



SDN-C DB Clustering details

See details from [SDN-C DB \(MySQL\) Clustered Deployment](#).

Deployment Setup Steps

You can use Rancher or kubeadm to deploy your Kubernetes cluster:

- [Deployment with Kubernetes Cluster Configured by Rancher](#) or
- [Deploying Kubernetes Cluster with kubeadm](#)

SDN-C Startup Order



- Do a describe of the pod using command `kubectl describe pod <pod-name>`, to ensure the **Init Container** section is presented as your defined in your yaml template.
- If it does not exist, it is possible that your [Kubernetes version supports a different format for the init-containers](#):

init-containers syntax supported by Kubernetes 1.5, 1.6 and 1.7 and not supported by Kubernetes 1.8 and greater	initContainers syntax supported from Kubernetes 1.6 and greater
---	---

Init container is defined under

`spec.template.metadata.annotations."pod.beta.kubernetes.io/init-containers"`

An example of init container by beta annotation

```
apiVersion: apps/v1beta1
kind: StatefulSet
metadata:
  name: sdnc
  ...
spec:
  ...
  template:
    metadata:
      ...
      annotations:
        pod.beta.kubernetes.io/init-containers: '[
          {
            "args": [
              "--container-name",
              "sdnc-db-container"
            ],
            "command": [
              "/root/ready.py"
            ],
            "env": [
              {
                "name": "NAMESPACE",
                "valueFrom": {
                  "fieldRef": {
                    "apiVersion": "v1",
                    "fieldPath": "metadata.namespace"
                  }
                }
              }
            ],
            "image": "{{ .Values.image.readiness }}",
            "imagePullPolicy": "{{ .Values.pullPolicy }}",
            "name": "sdnc-readiness"
          }
        ]'
```

```
spec:
  containers:
    ...
```

Init container is defined under `spec.template.spec.initContainers`

An example of init container by spec.

initContainers

```
apiVersion: apps/v1beta1
kind: StatefulSet
metadata:
  name: sdnc
  ...
spec:
  ...
  template:
    ...
    spec:
      initContainers:
        - command:
            - /root/ready.py
            - "--container-name"
            - "sdnc-db-container"
          env:
            - name: NAMESPACE
              valueFrom:
                fieldRef:
                  apiVersion: v1
                  fieldPath: metadata.namespace
      namespace
      image: "{{ .Values.image.readiness }}"
      readiness {{ .Values.image.readiness }}
      pullPolicy {{ .Values.pullPolicy }}
      name: sdnc-readiness
      containers:
        ...
```

Restart Dead Instance (start a new one in its place)

When a pod is dead, Kubernetes automatically starts a new one to replace the dead pod.

Examples:

- Pod-level restart:

```
ubuntu@sdnc-k8s:~/oom/kubernetes/config$ kubectl get pod --all-namespaces
```

NAMESPACE	NAME	READY	STATUS	RESTARTS	AGE
kube-system	heapster-4285517626-32km8	1/1	Running	0	15d
kube-system	kube-dns-638003847-vqz8t	3/3	Running	0	15d
kube-system	kubernetes-dashboard-716739405-tnxj6	1/1	Running	0	15d
kube-system	monitoring-grafana-2360823841-qfzhm	1/1	Running	0	15d
kube-system	monitoring-influxdb-2323019309-41q0l	1/1	Running	0	15d
kube-system	tiller-deploy-737598192-5663c	1/1	Running	0	15d
onap-sdnc	sdnc-0	2/2	Running	0	13m
onap-sdnc	sdnc-1	0/2	CrashLoopBackOff	14	13m
onap-sdnc	sdnc-2	2/2	Running	0	13m
onap-sdnc	sdnc-dbhost-0	1/1	Running	0	13m
onap-sdnc	sdnc-dbhost-1	1/1	Running	0	13m
onap-sdnc	sdnc-dgbuilder-356329770-pv73t	0/1	Running	5	13m
onap-sdnc	sdnc-portal-0	0/1	Running	5	13m
onap-sdnc	sdnc-portal-1	0/1	CrashLoopBackOff	6	13m

```
ubuntu@sdnc-k8s:~/oom/kubernetes/oneclick$ kubectl delete pod sdnc-0 -n onap-sdnc
pod "sdnc-0" deleted
```

```
ubuntu@sdnc-k8s:~/oom/kubernetes/oneclick$ kubectl get pods --all-namespaces -a
```

NAMESPACE	NAME	READY	STATUS	RESTARTS	AGE
kube-system	heapster-4285517626-32km8	1/1	Running	0	15d
kube-system	kube-dns-638003847-vqz8t	3/3	Running	0	15d
kube-system	kubernetes-dashboard-716739405-tnxj6	1/1	Running	0	15d
kube-system	monitoring-grafana-2360823841-qfzhm	1/1	Running	0	15d
kube-system	monitoring-influxdb-2323019309-41q0l	1/1	Running	0	15d
kube-system	tiller-deploy-737598192-5663c	1/1	Running	0	15d
onap	config	0/1	Completed	0	33m
onap-sdnc	sdnc-0	0/2	Terminating	0	17m
onap-sdnc	sdnc-1	0/2	CrashLoopBackOff	14	17m
onap-sdnc	sdnc-2	2/2	Running	0	17m
onap-sdnc	sdnc-dbhost-0	1/1	Running	0	17m
onap-sdnc	sdnc-dbhost-1	1/1	Running	0	16m
onap-sdnc	sdnc-dgbuilder-356329770-pv73t	0/1	Running	6	17m
onap-sdnc	sdnc-portal-0	0/1	Running	6	17m
onap-sdnc	sdnc-portal-1	0/1	CrashLoopBackOff	4	2m

```
ubuntu@sdnc-k8s:~/oom/kubernetes/oneclick$ kubectl get pods --all-namespaces -a
```

NAMESPACE	NAME	READY	STATUS	RESTARTS	AGE
kube-system	heapster-4285517626-32km8	1/1	Running	0	15d
kube-system	kube-dns-638003847-vqz8t	3/3	Running	0	15d
kube-system	kubernetes-dashboard-716739405-tnxj6	1/1	Running	0	15d
kube-system	monitoring-grafana-2360823841-qfzhm	1/1	Running	0	15d
kube-system	monitoring-influxdb-2323019309-41q0l	1/1	Running	0	15d
kube-system	tiller-deploy-737598192-5663c	1/1	Running	0	15d
onap	config	0/1	Completed	0	34m
onap-sdnc	sdnc-0	0/2	PodInitializing	0	10s
onap-sdnc	sdnc-1	0/2	CrashLoopBackOff	14	17m
onap-sdnc	sdnc-2	2/2	Running	0	17m
onap-sdnc	sdnc-dbhost-0	1/1	Running	0	17m
onap-sdnc	sdnc-dbhost-1	1/1	Running	0	16m
onap-sdnc	sdnc-dgbuilder-356329770-pv73t	0/1	Running	6	17m
onap-sdnc	sdnc-portal-0	0/1	Running	6	17m
onap-sdnc	sdnc-portal-1	0/1	CrashLoopBackOff	4	3m

```

ubuntu@sdnc-k8s:~/oom/kubernetes/oneclick$ kubectl get pods --all-namespaces -a
NAMESPACE      NAME                                                    READY    STATUS              RESTARTS   AGE
kube-system    heapster-4285517626-32km8                             1/1      Running             0          15d
kube-system    kube-dns-638003847-vqz8t                             3/3      Running             0          15d
kube-system    kubernetes-dashboard-716739405-tnxj6                 1/1      Running             0          15d
kube-system    monitoring-grafana-2360823841-qfhzm                  1/1      Running             0          15d
kube-system    monitoring-influxdb-2323019309-41q0l                 1/1      Running             0          15d
kube-system    tiller-deploy-737598192-5663c                       1/1      Running             0          15d
onap           config                                                  0/1      Completed           0          41m
onap-sdnc      sdnc-0                                                  2/2      Running             0          7m
onap-sdnc      sdnc-1                                                  0/2      CrashLoopBackOff    18         24m
onap-sdnc      sdnc-2                                                  2/2      Running             0          24m
onap-sdnc      sdnc-dbhost-0                                         1/1      Running             0          24m
onap-sdnc      sdnc-dbhost-1                                         1/1      Running             0          23m
onap-sdnc      sdnc-dgbuilder-356329770-pv73t                       0/1      Running             7          24m
onap-sdnc      sdnc-portal-0                                         0/1      Running             7          24m
onap-sdnc      sdnc-portal-1                                         0/1      CrashLoopBackOff    6          10m

```

Description of Initial sdnc-0	Description of restarted sdnc-0
<pre> ubuntu@sdnc-k8s:~/oom/kubernetes/config\$ kubectl describe pod sdnc-0 -n onap-sdnc Name: sdnc-0 Namespace: onap-sdnc Node: sdnc-k8s-2/10.147.90.6 Start Time: Thu, 23 Nov 2017 22:37:00 +0000 Labels: app=sdnc controller-revision-hash=sdnc-2443484326 Annotations: kubernetes.io/created-by={"kind":"SerializedReference", "apiVersion":"v1", "reference":{"kind":"StatefulSet", "namespace":"onap-sdnc", "name":"sdnc", "uid":"a576a1a3-d09f-11e7-957f-0269cb13eff1", "apiVersion":... pod.alpha.kubernetes.io/init-container-statuses=[{"name":"sdnc-readiness", "state":{"terminated":{"exitCode":0, "reason":"Completed", "startedAt":"2017-11-23T22:37:08Z", "finishedAt":"2017-11-23T22:37:53Z... pod.alpha.kubernetes.io/init-containers=[{"name":"sdnc-readiness", "image":"oomk8s/readiness-check:1.0.0", "command":["/root/ready.py"], "args":["--container-name", "sdnc-db-container"], "env":[{"name":"NA... pod.beta.kubernetes.io/init-container-statuses=[{"name":"sdnc-readiness", "state":{"terminated":{"exitCode":0, "reason":"Completed", "startedAt":"2017-11-23T22:37:08Z", "finishedAt":"2017-11-23T22:37:53Z... pod.beta.kubernetes.io/init-containers=[{"name":"sdnc-readiness", "image":"oomk8s/readiness-check:1.0.0", "command":["/root/ready.py"], "args":["--container-name", "sdnc-db-container"], "env":[{"name":"NAM... Status: Running IP: 10.42.107.61 Created By: StatefulSet/sdnc Controlled By: StatefulSet/sdnc ... </pre>	<pre> ubuntu@sdnc-k8s:~/oom/kubernetes/oneclick\$ kubectl describe pod sdnc-0 -n onap-sdnc Name: sdnc-0 Namespace: onap-sdnc Node: sdnc-k8s-2/10.147.90.6 Start Time: Thu, 23 Nov 2017 22:54:10 +0000 Labels: app=sdnc controller-revision-hash=sdnc-2443484326 Annotations: kubernetes.io/created-by={"kind":"SerializedReference", "apiVersion":"v1", "reference":{"kind":"StatefulSet", "namespace":"onap-sdnc", "name":"sdnc", "uid":"a576a1a3-d09f-11e7-957f-0269cb13eff1", "apiVersion":... pod.alpha.kubernetes.io/init-container-statuses=[{"name":"sdnc-readiness", "state":{"terminated":{"exitCode":0, "reason":"Completed", "startedAt":"2017-11-23T22:54:15Z", "finishedAt":"2017-11-23T22:54:15Z... pod.alpha.kubernetes.io/init-containers=[{"name":"sdnc-readiness", "image":"oomk8s/readiness-check:1.0.0", "command":["/root/ready.py"], "args":["--container-name", "sdnc-db-container"], "env":[{"name":"NA... pod.beta.kubernetes.io/init-container-statuses=[{"name":"sdnc-readiness", "state":{"terminated":{"exitCode":0, "reason":"Completed", "startedAt":"2017-11-23T22:54:15Z", "finishedAt":"2017-11-23T22:54:15Z... pod.beta.kubernetes.io/init-containers=[{"name":"sdnc-readiness", "image":"oomk8s/readiness-check:1.0.0", "command":["/root/ready.py"], "args":["--container-name", "sdnc-db-container"], "env":[{"name":"NAM... Status: Running IP: 10.42.185.227 Created By: StatefulSet/sdnc Controlled By: StatefulSet/sdnc ... </pre>

- Container-level restart:

```

ubuntu@sdnc-k8s-2:~$ kubectl get pod -n onap-sdnc -w
NAME          READY    STATUS              RESTARTS   AGE
sdnc-0        2/2      Running             0          46m
sdnc-1        2/2      Running             0          46m
sdnc-2        2/2      Running             0          46m
sdnc-dbhost-0 1/1      Running             0          46m
sdnc-dbhost-1 1/1      Running             0          46m
sdnc-dgbuilder-356329770-3n366 0/1      CrashLoopBackOff    11         46m
sdnc-portal-0 0/1      CrashLoopBackOff    11         46m
sdnc-portal-1 0/1      CrashLoopBackOff    14         46m

```

```

ubuntu@sdnc-k8s-2:~$ kubectl exec -it sdnc-0 -n onap-sdnc bash
Defaulting container name to sdnc-controller-container.
Use 'kubectl describe pod/sdnc-0' to see all of the containers in this pod.
root@sdnc-0:~# cd /opt/pendaylight/
root@sdnc-0:/opt/pendaylight# ls
current distribution-karaf-0.6.1-Carbon
root@sdnc-0:/opt/pendaylight# cd current
root@sdnc-0:/opt/pendaylight/current# ls
CONTRIBUTING.markdown LICENSE README.markdown bin build.url configuration data deploy etc idmlight.db.mv.db instances journal lib lock snapshots system taglist.log
root@sdnc-0:/opt/pendaylight/current# cd bin
root@sdnc-0:/opt/pendaylight/current/bin# ls
aaa-cli-jar.jar client.bat client.configure_cluster.sh instance karaf set.persistence.sh setenv.bat shell.bat start.bat status.bat stop.bat
client configure-cluster-ipdetect.sh custom_shard_config.txt instance.bat karaf.bat setenv shell start status stop
root@sdnc-0:/opt/pendaylight/current/bin# ps -ef |grep Karaf
root 1 0 5 16:42 ? 00:02:40 /usr/lib/jvm/java-8-openjdk-amd64/bin/java -Djava.security.properties=/opt/pendaylight/current/etc/odl.java.security -server -Xms128M -Xmx2048M -
XX:-UnlockDiagnosticVMOptions -XX:+UnsyncloadClass -XX:+HeapDumpOnOutOfMemoryError -Dcom.sun.management.jmxremote -Djava.security.egd=file:/dev/./urandom -Djava.endorsed.dirs=/usr/lib/jvm/java-8
-openjdk-amd64/jre/lib/endorsed:/usr/lib/jvm/java-8-openjdk-amd64/lib/endorsed:/opt/pendaylight/current/lib/endorsed -Djava.ext.dirs=/usr/lib/jvm/java-8-openjdk-amd64/jre/lib/ext:/usr/lib/jvm/j
ava-8-openjdk-amd64/lib/ext:/opt/pendaylight/current/lib/ext -DKaraf.instances=/opt/pendaylight/current/instances -DKaraf.home=/opt/pendaylight/current -DKaraf.base=/opt/pendaylight/current
-Dkaraf.data=/opt/pendaylight/current/data -DKaraf.etc=/opt/pendaylight/current/etc -Djava.io.tmpdir=/opt/pendaylight/current/data/tmp -Djava.util.logging.config.file=/opt/pendaylight/current
/etc/java.util.logging.properties -DKaraf.startLocalConsole=true -DKaraf.startRemoteShell=true -classpath /opt/pendaylight/current/lib/karaf-jaas-boot.jar:/opt/pendaylight/current/lib/karaf-o
rg.osgi.core.jar:/opt/pendaylight/current/lib/karaf.branding-1.8.1-Carbon.jar:/opt/pendaylight/current/lib/karaf.jar org.apache.karaf.main.Main
root 8938 8915 0 17:35 ? 00:00:00 grep --color=auto karaf
root@sdnc-0:/opt/pendaylight/current/bin# ls
aaa-cli-jar.jar client.bat client.configure_cluster.sh instance karaf set.persistence.sh setenv.bat shell.bat start.bat status.bat stop.bat
client configure-cluster-ipdetect.sh custom_shard_config.txt instance.bat karaf.bat setenv shell start status stop
root@sdnc-0:/opt/pendaylight/current/bin# ./stop

```

```

root@sdnc-0:/opt/pendaylight/current/bin# command terminated with exit code 137
ubuntu@sdnc-k8s-2:~$ kubectl get pod -n onap-sdnc -w
NAME          READY    STATUS    RESTARTS   AGE
sdnc-0        1/2      Running   1           50m
sdnc-1        2/2      Running   0           50m
sdnc-2        2/2      Running   0           50m
sdnc-dbhost-0 1/1      Running   0           50m
sdnc-dbhost-1 1/1      Running   0           49m
sdnc-dgbuilder-356329770-3n366 0/1      Completed 12          50m
sdnc-portal-0 0/1      CrashLoopBackOff 12          50m
sdnc-portal-1 0/1      CrashLoopBackOff 15          50m
sdnc-dgbuilder-356329770-3n366 0/1      CrashLoopBackOff 12          50m

```

```

ubuntu@sdnc-k8s-2:~$ kubectl get pod -n onap-sdnc -o wide
NAME          READY    STATUS    RESTARTS   AGE    IP             NODE
sdnc-0        2/2      Running   1           57m    10.42.255.79   sdnc-k8s-2
sdnc-1        2/2      Running   0           57m    10.42.150.26   sdnc-k8s-2
sdnc-2        2/2      Running   0           57m    10.42.82.56    sdnc-k8s-2
sdnc-dbhost-0 1/1      Running   0           57m    10.42.209.48   sdnc-k8s-2
sdnc-dbhost-1 1/1      Running   0           56m    10.42.35.159   sdnc-k8s
sdnc-dgbuilder-356329770-3n366 0/1      CrashLoopBackOff 13      57m    10.42.102.142   sdnc-k8s-2
sdnc-portal-0 0/1      CrashLoopBackOff 13      57m    10.42.87.140    sdnc-k8s-2
sdnc-portal-1 0/1      CrashLoopBackOff 16      57m    10.42.27.91     sdnc-k8s

```

ubuntu@sdnc-k8s-2:~\$ kubectl describe pod sdnc-0 -n onap-sdnc

Name: sdnc-0
 Namespace: onap-sdnc
 Node: sdnc-k8s-2/10.147.90.6
 Start Time: Fri, 24 Nov 2017 16:41:42 +0000
 Labels: app=sdnc

...

Containers:
 sdnc-controller-container:
 Container ID: [docker://d3cd42925952d43fa5d6cca359c52d7033fa8bdf5e31881eea424664dde0f634](#)
 Image: [nexus3.onap.org:10001/onap/sdnc-image:1.2-STAGING-latest](#)
 Image ID: [docker-pullable://nexus3.onap.org:10001/onap/sdnc-image@sha256:87171a78f8f3090a5f31b63bfead85ec80d220f3ddb4a08e5c98d02cc5edeca](#)
 Ports: 8181/TCP, 8101/TCP
 Command:
 /opt/onap/sdnc/bin/startODL.sh
 State: Running
 Started: Fri, 24 Nov 2017 17:37:41 +0000
Last State: Terminated
 Reason: Completed
 Exit Code: 0
 Started: Fri, 24 Nov 2017 16:42:15 +0000
 Finished: Fri, 24 Nov 2017 17:37:37 +0000
 Ready: True
 Restart Count: 1

...

Source Code

The source code is currently temporary shared through [gerrit topic SDNC-163](#) until it is committed into gerrit.

